

Miscellaneous Water Quality Influences

Algal Blooms

Algae occur naturally all over the world and are part of the food chain. However, under suitable conditions, algae can proliferate to levels that adversely affect natural resources or humans. This is called an algal bloom. These blooms are not a new phenomenon, but the relatively recent boom in human population and land use alteration has made algal blooms more prevalent in recent years. Warm and calm waters with high levels of nutrients and low levels of turbidity and color are prime candidates for a bloom. These blooms can last weeks or months and turn the water bright green. In most cases, blooms are most prevalent during the summer months and die back during the cold winter months.

Algal blooms cause multiple detrimental effects to waterbodies. During daylight hours when algae produce oxygen, supersaturated oxygen levels can occur, whereas night time respiration of algae can cause oxygen supplies to be depleted in the water column causing organisms relying on oxygen to die. Blooms can also interfere with vegetation in the water by blocking sunlight from plants, which hinders photosynthesis and alters water temperature.

Another concern with algal blooms is the possibility of toxin production. Certain blue-green algae release toxins when the cells die or are ingested. There are about 20 species, or groups of freshwater or freshwater-estuarine blue-green algae, that are toxic or potentially toxic occurring in Florida waters. Depending on the type of toxin produced, health effects can range from gastroenteritis, asthma or eye irritation to liver damage, paralysis or death. More information regarding toxins produced by algae and their effects can be found at the [World Health Organization's Water Sanitation Health website](#).

Fish Consumption Advisories

Mercury is a toxic metal that can cause learning and memory problems in children. Mercury can be naturally found in the environment or may occur due to pollution from electric power plants, mining and other industrial sources. Most Florida fish have low to medium levels of mercury. Other industrial toxins found in fish include polychlorinated biphenols (PCBs), which have been known to cause cancer and can negatively affect the immune system, reproductive system, nervous system and endocrine system of animals, including humans. To lower the risk of harm from mercury (or other contaminants) found in fish caught in Florida, the Florida Department of Health (FDOH) developed a set of guidelines based on tests of various freshwater waterbodies to allow people to determine the amount of fish to eat or avoid. The guidelines for Leon County waterbodies are shown in the following table. For more information regarding fish advisories please visit the [FDOH's Fish Consumption Advisories webpage](#).

Water Body	Species	Women of childbearing age, young children (# of meals)	All Other Individuals (# of meals)
Joe Budd Pond	Bluegill, Channel catfish, Sunshine Bass	Two per week	Two per week
Lake Bradford	Bluegill	One per month	Two per week
Lake Iamonia	Bluegill, Redear sunfish, Black crappie	One per week	Two per week
	Brown bullhead catfish	Two per week	Two per week
	Largemouth bass	One per month	One per week
Lake Jackson	Bluegill, Redear sunfish, Black crappie	Two per week	Two per week
	Largemouth bass	One per month	Two per week
	Warmouth	One per week	Two per week
Lake Miccosukee	Bluegill	Two per week	Two per week
	Largemouth bass	One per month	One per week
Lake Munson (PCBs)	Largemouth bass 19 inches or more	One per month	One per month
Lake Munson	Brown bullhead catfish, Bluegill, Redear sunfish	Two per week	Two per week
	Largemouth Bass	One per week	Two per week
	Black crappie	One per month	One per week
Lake Talquin	Bluegill, Black crappie, Brown bullhead catfish, Redbreast sunfish, Redear sunfish, Spotted bullhead catfish	Two per week	Two per week
	Largemouth bass	One per month	One per month
Lake Tom John	Largemouth bass	One per month	One per week
Moore Lake	Largemouth bass	One per month	One per month
Ochlockonee River and tributaries	Bluegill, Redbreast sunfish, Channel catfish, Spotted sunfish, Striped bass, Warmouth	One per month	One per week
	Flathead catfish, Redear sunfish	One per month	One per month
	Largemouth bass	DO NOT EAT	One per month
Ochlockonee River north of US 90 bridge	Bluegill, Redbreast sunfish, Redear sunfish, Spotted sunfish, Warmouth	One per month	One per week
	Black crappie	One per month	One per month

	Flathead catfish, Largemouth bass	DO NOT EAT	One per month
Piney Z Lake	Redear sunfish, Warmouth	Two per week	Two per week
	Bluegill, Brown bullhead catfish	One per week	Two per week
	Largemouth bass	One per month	One per week
St. Marks River	Bluegill, Redfish sunfish, Spotted sunfish, Striped mullet	Two per week	Two per week
	Redear sunfish	One per week	Two per week
	Black crappie, Warmouth	One per month	Two per week
	Largemouth bass	One per month	One per week

Rainfall

Leon County had a slightly dryer than normal conditions in 2017 (Figure 1). Rainfall for 2017 (Figure 2) measured 55.19 inches (4.04 inches below normal). The wettest month was June with 12.74 inches of rain. The driest month was November when only 0.53 inches of rain fell.

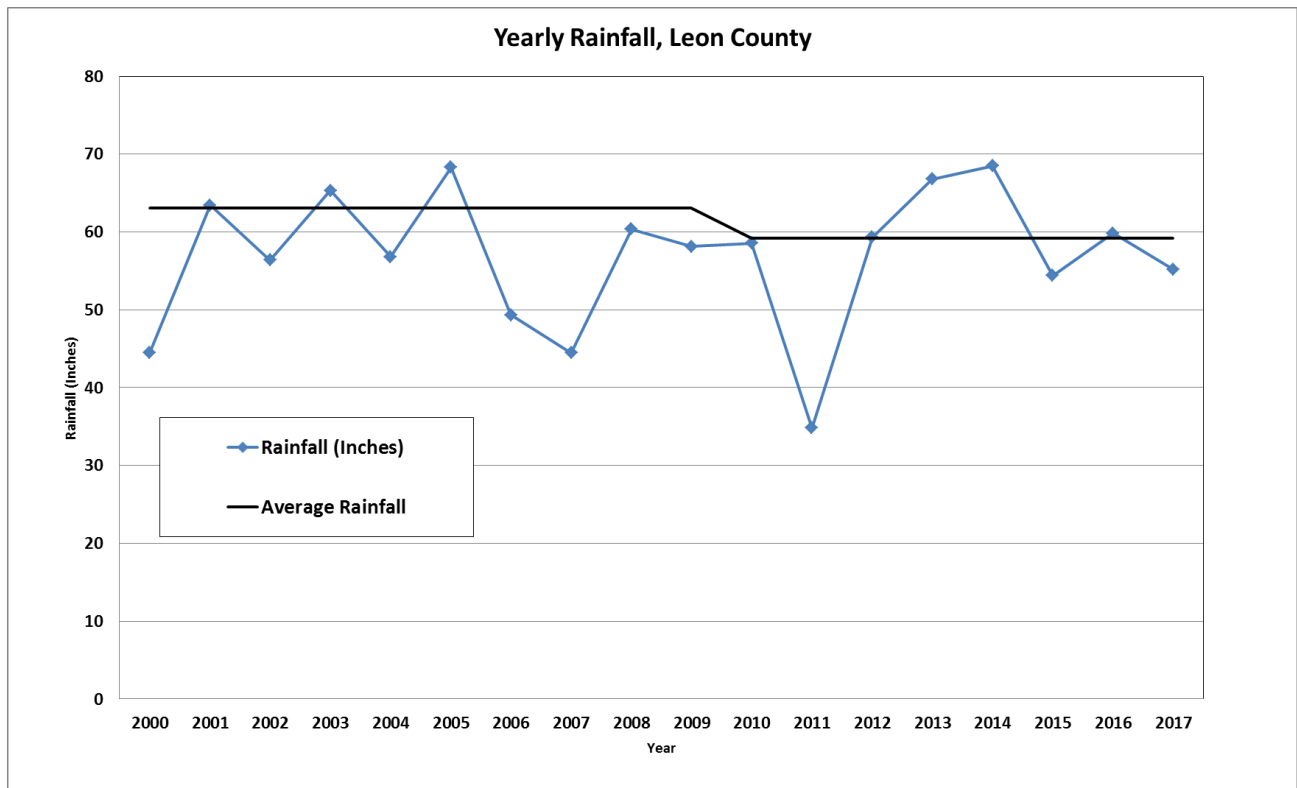


Figure 1. Annual rainfall 2000-2017.

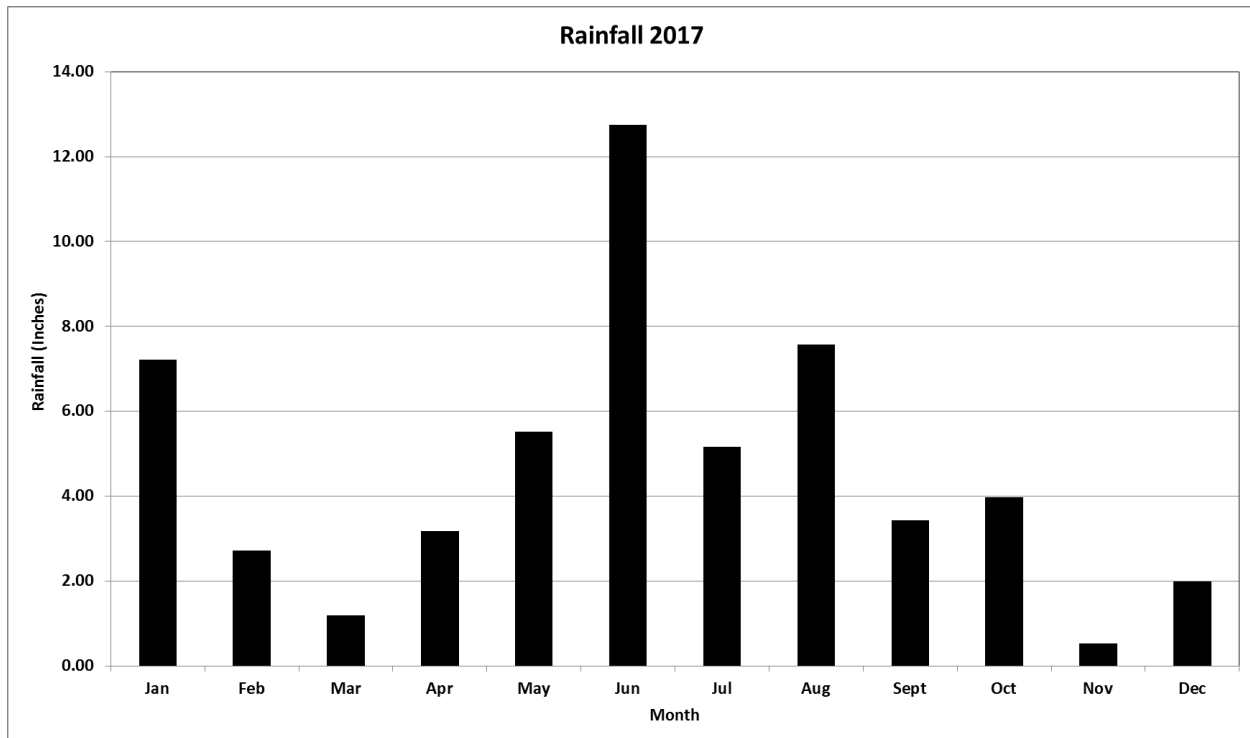


Figure 2. Monthly Rainfall (2017).

During a drought, water levels in lakes and streams can drop significantly, and some can even dry up completely. While low water levels can cause a decline in plants and wildlife, many are adapted to the cycle of drought. For example, periodic dry spells can benefit the health of a lake by allowing sediment in the lake bottom to oxidize.

However, water quality can decline as the concentration of pollutants increases when water evaporates and becomes stagnant. As a counterbalance, pollutants associated with stormwater runoff are not an issue during drought events, so an urban stream's baseflow may be less polluted during a drought than during normal rainfall patterns.

During periods of excessive rainfall, water can enter the watershed too quickly to be absorbed into the ground, causing stormwater runoff. Watersheds in urban areas tend to have more runoff than forested areas since the urban areas, with their impervious surfaces of pavement, roofs and concrete, shed water quickly. Conversely, forested or grassy areas allow water to naturally soak into the ground.

Land Use

One of the most important factors that affect water quality is watershed land use. Rain falling on undeveloped "natural" land normally soaks into the vegetation and soil, flows through the soil and feeds streams, lakes, and aquifers. When land is developed, and vegetation cleared, soil is compacted or covered by impervious areas. Water, instead of soaking into the ground or vegetation, flows off rooftops, parking lots and roads. As the water flows, whatever lies on the surface is picked up, including fertilizers and pesticides from lawns, oil and gasoline that leak from vehicles, etc. This runoff then flows into stormwater conveyances, stormwater ponds or

directly into streams or lakes. Increased impervious area and more efficient transport of stormwater runoff via pipes can cause hydrological, chemical, stream morphological, biological, and nutrient processing changes to streams and lakes.

Problems generally associated with urban streams (modified from Walsh et al, 2005). Responses are those that have been observed to increase (↑) or decrease (↓) with increased urbanization.

Feature	Response
Hydrology	↑ Frequency of overland flow ↑ Frequency of erosive flow ↑ Magnitude of high flow ↓ Lag time to peak flow ↑ Rise and flow of storm hydrograph
Water Chemistry	↑ Nutrients ↑ Toxicants ↑ Temperature
Channel Morphology	↑ Channel width ↑ Pool depth ↑ Scour ↑ Channel complexity
Organic Matter	↓ Water retention
Fishes	↓ Sensitive fishes
Invertebrates	↑ Tolerant invertebrates ↓ Sensitive invertebrates
Algae	↑ Eutrophic diatoms ↓ Oligotrophic diatoms
Ecosystem Processes	↓ Nutrient uptake

In determining possible sources and causes of water quality and biological issues, pie charts were created in 2017 by utilizing the Florida Department of Environmental Protection's (FDEP) Florida Land Use Land Cover data and the National Map Land Cover data (2011) from the United States Geological Survey (USGS) for the areas in Georgia. These charts are included in each waterbody summary page.

Reference

Walsh, C. J., Roy, A. H., Feminella, J. W., Cottingham, P. D., Groffman, P. M., Morgan II, R. P. 2005. The urban stream syndrome: current knowledge and the search for a cure. *Journal of the North American Benthological Society* 24(3): 706-723